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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
DHINGRA, RAKESH KUMAR	
ART UNIT	PAPER NUMBER
1792	

NOTIFICATION DATE	DELIVERY MODE
12/22/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/578,184	OHMI ET AL.	
	Examiner	Art Unit	
	RAKESH DHINGRA	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *03* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 September 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10 and 12-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10 and 12-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *04 May 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 9/30/09 has been entered.

Response to Arguments

Applicant's arguments with respect to claims 1-11 have been considered but are moot in view of the new ground(s) of rejection as explained hereunder.

Applicant has amended claims 1, 3 by adding new limitations, e.g. in claim1 new limitation "the cooling medium mixer including: a mist source to generate the mist by atomizing supplied HzO using an ultrasonic wave; and a mixing part to mix the cooling gas and the mist into the cooling medium", has been added. Further applicant has cancelled claim 11 and added new claims 12-14..

Accordingly claims 1-10, 12-14 are now pending and active.

New reference by Hamden-Smith et al (US 6,338,809) when combined with Ohmi et al and Petvai et al reads on limitation of amended claim 1 including the newly added limitation. Accordingly claims 1, 2 have been rejected under 35 USC 103 (a) as explained below. Further, new reference by Chen et al (US 2003/0121608) when combined with Ohmi et al and Harano et al reads on limitation of amended claim 3. Accordingly claims 3-6, 9, 10 have been rejected

under 35 USC 103 (a) as explained below. Balance claims 7, 8, 12-14 have also been rejected under 35 USC 103 (a) as explained below.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohmi et al (US PGPUB 2003/0178144) in view of Petvai et al (US 6,053,984) and Hampden-Smith et al (US 6,338,809).

Regarding Claim 1: Ohmi et al teach a plasma apparatus comprising:

a processing vessel 11 having a holder 13 holding a substrate 12 to be processed;

a microwave antenna 20 provided on the processing vessel so as to oppose the substrate to be processed; and

a processing gas supply part 31 provided between the substrate to be processed on the holder 13 and the microwave antenna 20 so as to oppose the substrate to be processed,

the process gas supply part 31 has a plurality of first openings 31A through which plasma formed in the processing vessel passes, a process gas channel 31B connectable to a process gas source, a plurality of second openings 31D communicating with the process gas channel. Ohmi et al also teach a cooling medium channel 31e in the processing gas supplying part 32 through which a coolant flows to enable provide proper temperature of the process gas (e.g. Figs. 3 -5, 11 and para. 0049-0051, 0062-0070, 122).

Ohmi et al do not teach a cooling medium mixer that includes a mist source to generate the mist by atomizing supplied water using an ultrasonic wave and a mixing part to mix the cooling gas and the mist into the cooling medium.

Petvai et al teach a semiconductor processing apparatus comprising a processing chamber 24 and further including a mist source 43 (Figs. 4, 5) that generates mist of water droplets in a carrier gas and supply the same to the cooling medium channel of the process gas supply part (e.g . Figs. 4, 5, 9 and col. 5, line 7 to col. 6, line 45).

Therefore it would have been obvious to one of ordinary skills in the art at the time of the invention to provide a cooling medium mixer for supplying a cooling medium including a mixture of cooling gas and mist as taught by Petvai et al in the apparatus of Ohmi et al to enable supply the coolant into the cooling medium channel and control temperature of the process gas.

Ohmi et al in view of Petvai et al teach a mist source that generates mist by atomizing water, but do not teach a cooling medium mixer that includes a mixing part to mix the cooling gas and the mist, and also do not teach that mist is atomized by using an ultrasonic wave.

However use of ultrasonic wave to generate mist from a fluid, and use of a mixing part to mix the mist with a cooling gas are known in the art as per reference cited hereunder.

Hampden-Smith et al teach a cooler assembly 330 comprising a stream of aerosol 112 and a mixing part 338 wherein the aerosol (mist) 112 with a gas 346 mix and then exit through an outlet 340. Hampden-Smith et al also teach that aerosol (mist) is produced using ultrasonic generator 106. Hampden-Smith et al additionally teach that the apparatus can be used for a plasma reactor (e.g. Figs. 41-43 and col. 9, lines 55-60 and col. 21, line 61 to col. 22, line 53). It would be obvious to provide a cooling medium mixer with a mixing part to mix the cooling gas and the mist into the cooling medium as per teaching of Hampden-Smith et al in the apparatus of Ohmi et al in view of Petvai et al to avoid directing the mist stream directly on the cool surfaces and thus reduce thermo-phoretic losses compared to a conventional heat exchanger.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to provide a cooling medium mixer with a mixing part as taught by Hampden-Smith et al in the apparatus of Ohmi et al in view of Petvai et al to avoid directing the mist stream directly on the cool surfaces and thus reduce thermo-phoretic losses compared to a conventional heat exchanger.

Regarding Claim 2: Claim limitations regarding cooling medium including SF6 pertain to contents of apparatus during intended operation of the apparatus and is not considered to add patentable weight.

In this regard courts have ruled:

Expressions relating the apparatus to contents thereof during an intended operation are of no significance in determining patentability of the apparatus claim. Ex parte Thibault, 164 USPQ 666, 667 (Bd. App. 1969).

Claims 3-6, 9, 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohmi et al (US PGPUB 2003/0178144) in view of Harano et al (US 2003/0126872) and Chen et al (US 2003/0121608).

Regarding Claims 3, 4: Ohmi et al teach all limitations of the claim (as already explained above under claim 1) including process gas introducing part with a cooling medium channel 31e in the processing gas supplying part 32 through which a coolant flows to enable provide proper temperature of the process gas (e.g. Figs. 3 -5, 11 and para. 0049-0051, 0062-0070, 122).

Ohmi et al do not teach a cooling medium circulator circulating the cooling medium is connected to the cooling medium channel and configured to circulate the cooling medium, the cooling medium circulator including a compressor configured to compress the cooling medium and a reserve tank that retains the compressed cooling medium, and also do not teach the processing gas supply part attached to the processing vessel through a heat insulating part.

However use of a heat exchanger (circulator) with compressor and tank for circulating the cooling medium is known in the art as per reference cited hereunder.

Harano et al teach a wafer processing apparatus comprising a circulator connected to a cooling medium channel 21 and configured to circulate a cooling medium, and that includes a compressor 26 configured to compress the cooling medium and a tank 22 (reserve tank) that circulates (includes retains) the compressed cooling medium as per temperature and flow requirements (e.g. Fig. 1 and para. 0022 – 0034). It would be obvious to provide a cooling

medium circulator as per teaching of Harano et al in the apparatus of Ohmi et al to control temperature of the process gas supplying part, to enable control temperature of the process gas.

Therefore it would have been obvious to one of ordinary skills in the art at the time of the invention to provide a circulator for circulating a cooling medium as taught by Harano et al in the apparatus of Ohmi et al to control temperature of the process gas supplying part, to enable control temperature of the process gas.

Ohmi et al in view of Harano et al teach process gas supply part connected to the process chamber but do not teach the processing gas supply part attached to the processing vessel through a heat insulating part.

However provision of a heat insulating part between the gas line and the processing vessel is known in the art as per reference cited hereunder.

Chen et al teach a wafer processing apparatus comprising gas lines 255 that do not contact a chamber body 202 and are separated from the chamber body by an insulating part which minimizes the heat transfer between the gas lines and the chamber body 202 (e.g. Fig. 15 and para. 0097). It would be obvious to provide a heat insulating part between the process gas supply part and the processing vessel as taught by Chen et al in the apparatus of Ohmi et al in view of Harano et al to minimize the heat transfer between the gas lines and the chamber body.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to provide a heat insulating part between the process gas supply part and the processing vessel as taught by Chen et al in the apparatus of Ohmi et al in view of Harano al et al to minimize the heat transfer between the gas lines and the chamber body.

Regarding Claim 4: Harano et al teach the circulator includes heat exchangers 25, 29 for cooling the cooling fluid (Fig. 1 and para. 0022).

Regarding Claims 5, 6: Applicant has invoked 35 USC 112, 6th paragraph in respect of claim limitations –" cooling medium control means" for which the applicant's disclosed structure includes a mass flow controller /variable conductance valve 55 (Fig. 7 and page 23, line 10 to page 25, line 15). Further, regarding claim limitation "temperature measurement means" 35 USC 112, 6th paragraph is not considered to be invoked since applicant has not disclosed any specific structure for temperature measurement means 57.

Harano et al teach the cooling medium circulator includes a temperature sensor 23, a temperature controlling device 34 and a coolant medium flow rate controlling device 40 such that flow rate of cooling medium is controlled based upon sensed temperature (Harano et al – Fig. 1 and para. 0025-0032).

Regarding Claims 9, 10: Claim limitations wherein the cooling medium includes a cooling gas and mist, and the cooling medium includes SF6 pertain to contents of apparatus during intended operation of the apparatus and is not considered to add patentable weight.

In this regard courts have ruled:

Expressions relating the apparatus to contents thereof during an intended operation are of no significance in determining patentability of the apparatus claim. Ex parte Thibault, 164 USPQ 666, 667 (Bd. App. 1969).

Claims 7, 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohmi et al (US PGPUB 2003/0178144) in view of Harano et al (US 2003/0126872) and Chen et al (US 2003/0121608) as applied to claims 3-6, 9, 10 and further in view of Paganessi (US 5,660,047).

Regarding Claims 7, 8: Ohmi et al in view of Harano et al and Chen et al teach all limitations of the claim except the cooling medium control means is a pressure control means for controlling pressure of the cooling medium.

Applicant has invoked 35 USC 112, 6th paragraph in respect of claim limitations –" cooling medium control means" for which the applicant's disclosed structure includes a mass flow controller /variable conductance valve 55 (Fig. 7 and page 23, line 10 to page 25, line 15).

Paganessi teaches a plasma apparatus comprising a cooling control means that includes pressure control means 40 that controls 14, 16, 24, 26 etc based on input from pressure sensors P and temperature sensors T (e.g. Fig. 1 and col. 4, lines 46-55). Though Paganessi do not explicitly teach that the temperature control means controls temperature of process gas supplying device it would be obvious to provide the same for obtaining temperature control of process gas supplying part based on the temperature measured by the temperature measurement means.

Therefore it would have been obvious to one of ordinary skills in the art at the time of the invention to provide pressure control as the cooling medium control means as taught by Paganessi in the apparatus of Ohmi et al in view of Harano et al and Chen et al as a known alternate means to control temperature of the process gas supplying part.

In this regard courts have ruled:

The selection of a known material based on its suitability for its intended use is prima facie obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945).

Regarding Claim 8: Claim limitation pertaining to pressure of the cooling medium channel being set to 0.2 – 1 MPa is a functional limitation and since the apparatus of prior art

meets the structural limitations of the claim, the same is considered capable of meeting the functional limitation.

In this regard courts have ruled:

Claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Danly*, 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959). Apparatus claims cover what a device is, not what a device does *Hewlett-Packard Co. V. Bausch & Lomb Inc.,* 15USPQ2d 1525, 1528 (Fed. Cir. 1990).

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ohmi et al (US PGPUB 2003/0178144) in view of in view of Petvai et al (US 6,053,984) and Hampden-Smith et al (US 6,338,809) as applied to claims 1, 2 and further in view of Chen et al (US 2003/0121608).

Regarding Claim 12: Ohmi et al in view of Petvai et al and Hampden-Smith et al teach all limitations of the claim except the processing gas supply part attached to the processing vessel through a heat insulating part.

However provision of a heat insulating part between the gas line and the processing vessel is known in the art as per reference cited hereunder.

Chen et al teach a wafer processing apparatus comprising gas lines 255 that do not contact a chamber body 202 and are separated from the chamber body by an insulating part which minimizes the heat transfer between the gas lines and the chamber body 202 (e.g. Fig. 15 and para. 0097). It would be obvious to provide a heat insulating part between the process gas supply part and the processing vessel as taught by Chen et al in the apparatus of Ohmi et al in view of Harano et al to minimize the heat transfer between the gas lines and the chamber body.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to provide a heat insulating part between the process gas supply part and the

processing vessel as taught by Chen et al in the apparatus of Ohmi et al in view of Petvai et al and Hampden-Smith et al et al to minimize the heat transfer between the process gas supply part and the chamber body.

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ohmi et al (US PGPUB 2003/0178144) in view of in view of Petvai et al (US 6,053,984), Hampden-Smith et al (US 6,338,809) and Chen et al (US 2003/0121608) as applied to claim 12 and further in view of Keller et al (US 2002/0069968).

Regarding Claim 13: Ohmi et al in view of Petvai et al, Hampden-Smith et al and Chen et al teach all limitations of the claim including a heat insulating part between the process gas supply part and the processing vessel, but do not teach the heat insulating part includes two components and the two components increase a thermal resistance between the processing vessel and the process gas supply part.

Keller et al teach a plasma apparatus comprising a gas inlet manifold that thermally isolates a gas distribution plate (process gas supply part) from the other chamber components e.g. lid 18 and chamber wall 10, which reduces heat loss from the perimeter of the gas diffuser between the center and the perimeter of the gas distribution plate. Keller et al further teach that thermal insulation is achieved by parts like inlet manifold side wall 24, backwall 28 etc (i.e. two components included in the heat insulating part){these parts would [e.g. Fig. 1 and para. 0111-0114]. It would have been obvious to provide the heat insulating part between the process gas supply part and the processing vessel with two components as taught by Keller et al in the apparatus of Ohmi et al in view of Petvai et al, Hampden-Smith et al and Chen et al to minimize

heat loss to the from the process gas supply part to the processing vessel and supply the gas at a uniform temperature to the processing region in the chamber.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the heat insulating part with two components as taught by Keller et al in the apparatus of Ohmi et al in view of Petvai et al, Hampden-Smith et al and Chen et al to minimize heat loss to the from the process gas supply part to the processing vessel and supply the gas at a uniform temperature to the processing region in the chamber.

Further, claim limitation "increase a thermal resistance between the processing vessel and the process gas supply part is a functional limitation, an since the structure of the prior art apparatus meets the structural limitations of the claim, the same is considered capable of meeting the functional limitation.

In this regard courts have ruled:

While features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. [In re Schreiber, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429, 1431-32 (Fed. Cir. 1997)].

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ohmi et al (US PGPUB 2003/0178144) in view of Petvai et al (US 6,053,984) and Chen et al (US 2003/0121608) as applied to claim 3 and further in view of Keller et al (US 2002/0069968).

Regarding Claim 13: Ohmi et al in view of Petvai et al and Chen et al teach all limitations of the claim including a heat insulating part between the gas line and the processing vessel, but do not teach the heat insulating part includes two components and the two components increase a thermal resistance between the processing vessel and the process gas supply part.

Keller et al teach a plasma apparatus comprising a gas inlet manifold that thermally isolates a gas distribution plate (process gas supply part) from the other chamber components e.g. lid 18 and chamber wall 10, which reduces heat loss from the perimeter of the gas diffuser between the center and the perimeter of the gas distribution plate. Keller et al further teach that thermal insulation is achieved by parts like inlet manifold side wall 24, backwall 28 etc (i.e. two components included in the heat insulating part){these parts would [e.g. Fig. 1 and para. 0111-0114]. It would have been obvious to provide the heat insulating part between the process gas supply part and the processing vessel with two components as taught by Keller et al in the apparatus of Ohmi et al in view of Petvai et al and Chen et al to minimize heat loss to the from the process gas supply part to the processing vessel and supply the gas at a uniform temperature to the processing region in the chamber.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the heat insulating part with two components as taught by Keller et al in the apparatus of Ohmi et al in view of Petvai et al and Chen et al to minimize heat loss to the from the process gas supply part to the processing vessel and supply the gas at a uniform temperature to the processing region in the chamber.

Further, claim limitation "increase a thermal resistance between the processing vessel and the process gas supply part is a functional limitation, an since the structure of the prior art apparatus meets the structural limitations of the claim, the same is considered capable of meeting the functional limitation.

In this regard courts have ruled:

While features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. [In re Schreiber, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429, 1431-32 (Fed. Cir. 1997)].

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to RAKESH DHINGRA whose telephone number is (571)272-5959. The examiner can normally be reached on 8:30 - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/R. D./
Examiner, Art Unit 1792

/Karla Moore/
Primary Examiner, Art Unit 1792